



# NIXON PEABODY LLP

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June 2, 2000

## VIA HAND DELIVERY

Magalie R. Salas  
Secretary  
Federal Communications Commission  
445 Twelfth Street, SW  
Washington, DC 20554

Re: Ex Parte Presentation  
WB Docket 94-102

Dear Ms. Salas:

On Thursday, June 1, 2000, representatives of QUALCOMM Incorporated ("QUALCOMM") met with representatives of the Commission to discuss QUALCOMM's process for the production of GPSOne chipsets and reconfirmed that QUALCOMM will meet development and production schedules for this equipment, as reflected in the record of this proceeding. QUALCOMM also discussed previously announced agreements with other manufacturers to develop GPS-enabled chipsets. QUALCOMM also presented data on the E-OTD location technology, including results of a recent field trial of this technology. Finally, QUALCOMM discussed industry progress in the application of GPS technology for non-CDMA handsets.

Present at the meeting on behalf of QUALCOMM were Jonas Neihardt, Vice President, Federal Government Affairs and Ellen Kirk, Vice President, Marketing and Strategic Planning. Representing the FCC were Kris Monteith, Dan Grosh, Patrick Forster and Martin Liebman.

Magalie R. Salas  
June 2, 2000  
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The attached materials were distributed at the meeting.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Veronica M. Ahern".

Veronica M. Ahern

cc: Kris Monteith, FCC Wireless Telecommunications Bureau  
Dan Grosh, FCC Wireless Telecommunications Bureau  
Patrick Forster, FCC Wireless Telecommunications Bureau  
Martin Liebman, FCC Wireless Telecommunications Bureau



June 1, 2000



# *Accuracy Requirements*

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- Sept. '99 rule modification balanced expected accuracies and deployment timing
  - Handset-based technology will phase in with new *handset* purchase
    - Compliance of wireless-assisted GPS with the tighter accuracy standard has been demonstrated in audited field tests across a full range of user environments
  - All phones should be locatable when and where *network* equipment is fully installed
    - Network (terrestrial) technologies are inherently accuracy-constrained
      - “Terrestrial triangulation systems are inevitably limited by multipath; wireless-assisted GPS is expected to achieve an order of magnitude better accuracy.” - Lucent Technologies, TR 45 filing



## *E-OTD*

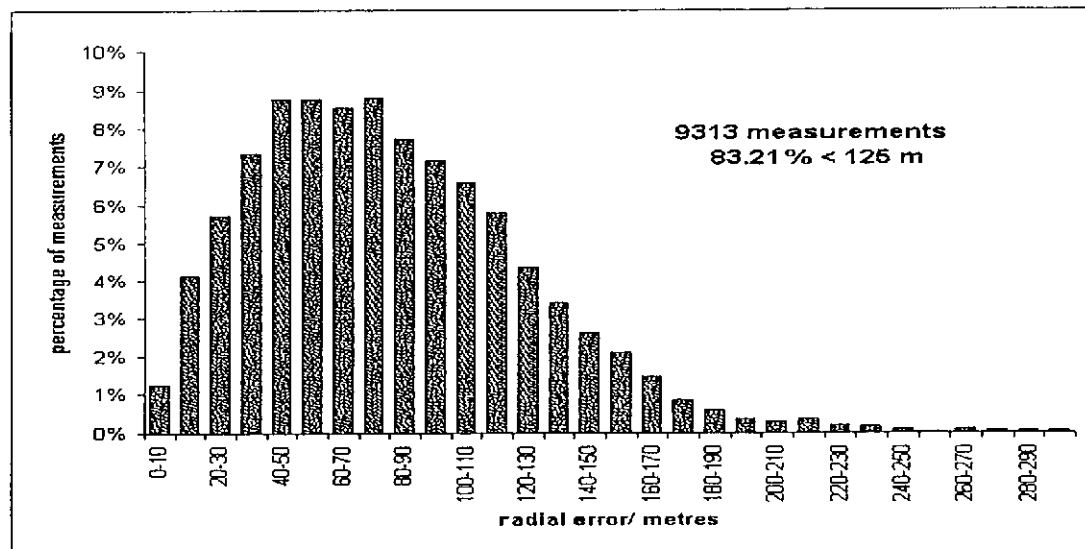
- E-OTD is one of the location methodologies being provisioned in 3G standards; wireless-assisted GPS is another methodology being standardized
- Results of medium scale E-OTD trial have been presented to T1P1.5 LCS\*
- Test conditions
  - Test area: Cambridge UK
  - Size of test area: 150 km<sup>2</sup>
  - Number of test results: ~9,000 fixes
  - Number of test locations: 94
  - Environment mix: "Urban" & suburban (indoor/outdoor)
  - Number of measurements per result: 3
  - Measurement interval/total fix time: 15 seconds/45 seconds
  - Number of BTS measured: up to 7 BTS

\*Source: T1P1.5/99-390r1, 6/25/99



## *E-OTD: Accuracy*

- Summary of results:
  - 67% at <98m error
  - 83% at <125m error



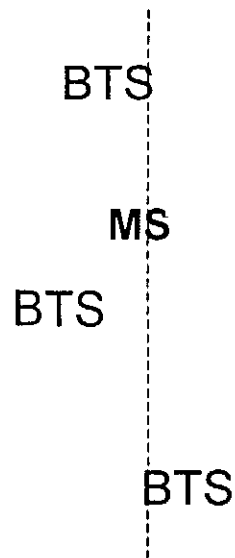
- Comments on test conditions
  - This area tends to be very flat
  - Most buildings tend to rise only 2-3 stories
  - Basic environment favorable for: BTS visibility, reduced multipath
  - Three measurement sets at 15 second intervals are required for averaging
    - 45 second epochs
    - **3 sets are required to improve single-set accuracy by 60%**



## *E-OTD Limitations*

- Some problematic cases have no sensible remedy

- Highway scenario:  
quasi-linear arrangement of BTSs



- Network periphery scenario:  
all visible BTSs appear colocated



- Even with such configuration issues ignored, E-OTD performance still falls in the ~100m ballpark 67% of the time



# *Improving E-OTD Accuracy*

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- Challenges to improving upon 100m accuracy
  - Visibility of BTS signals
  - ***Inherent*** terrestrial multipath propagation effects
  - Co-channel and adjacent channel interference
  - Local BTS geometry
- Attempts to realize improved accuracy might include:
  - Restricting operation to only open suburban areas
  - Increasing the number of measurements sets averaged per location fix
  - Increasing length of measurement intervals for building SNR levels
  - Specifically tailoring network with additional cell sites in problem areas
    - Would require adjusting the network for location rather than capacity



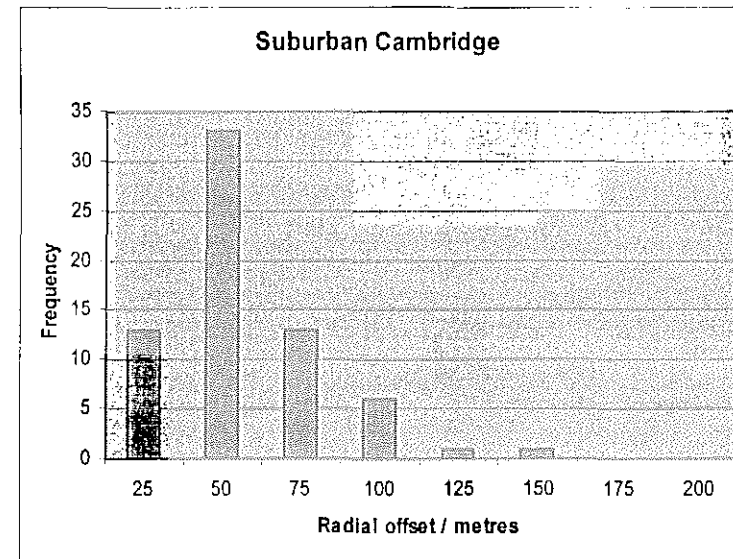


# *Improving E-OTD Accuracy (2)*

- Recently published test results claim 50m capability
  - 69% at <50m error

- Test conditions

- Test area:
- Size of test area:
- Number of test results:
- Environment:
- Number of measurements per result: 5
- Measurement interval/total fix time: 120 seconds/10 minutes



Cambridge UK

4.2 km<sup>2</sup>

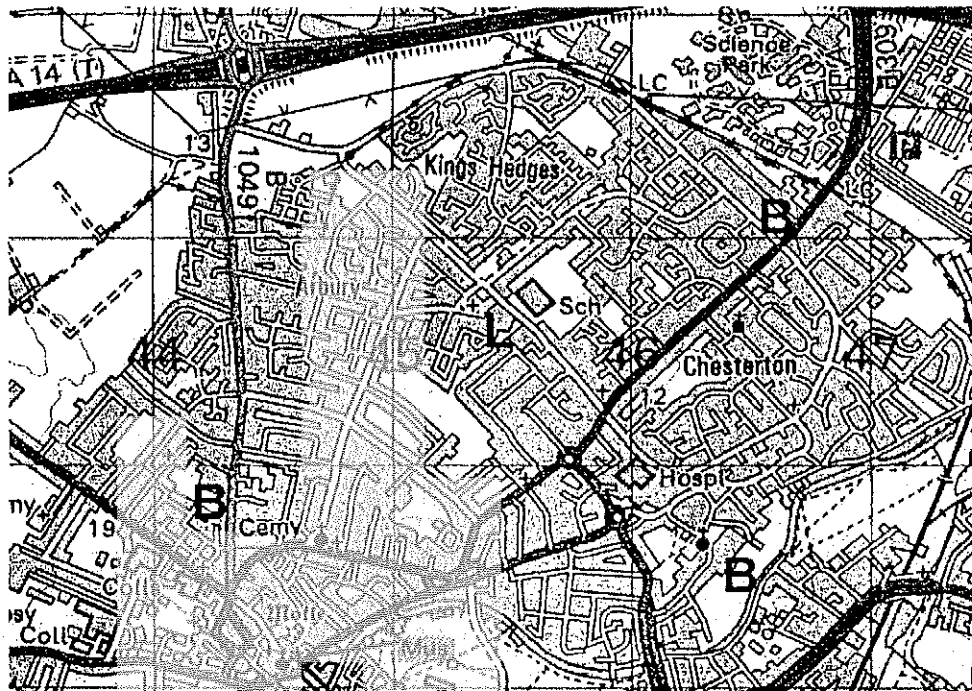
~300 fixes

Outdoor suburban



# *Improving E-OTD Accuracy (3)*

- Test conditions (cont'd)
  - Highly favorable BTS geometry
    - B= BTS                      L= LMU



Source: T1P1.5/00-0234



## *E-OTD Summary*

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- Overlay solutions like the proposed “Network Software Solution” do not address Public Safety’s Phase II requirement
  - Associated positioning errors can be several kilometers in magnitude
  - “Tuning” such overlay solutions (e.g., with signal strength) is impractical
- Publicly available E-OTD test data indicates ~100m accuracy
  - Characteristic of methods that exclusively use terrestrial network measurements
  - Similar to expected and simulated uplink-TOA performance
- Proposed path from 100m to 50m accuracy is unrealistic for E-OTD
  - Highly constrained test conditions and/or test methodologies must be employed to demonstrate accuracy that approaches 50m
  - There is no feasible and cost effective way to get to a robust 50m E-OTD capability



## IMMEDIATE RELEASE

# Texas Instruments Licenses SnapTrack's Personal Location System™

### *Agreement Deepens SnapTrack's Relationship With World Leader in Wireless DSP*

SAN JOSE, Calif., June 8, 1999 - In a move that further solidifies its position as the leader in the emerging personal location technology market, SnapTrack Inc. today announced an agreement with Texas Instruments (NYSE: TXN) to develop an end-to-end digital signal processor (DSP) solution that will add location capabilities to millions of new wireless phones.

"This agreement is a key milestone in our vision of making SnapTrack technology the foundation for personal location services worldwide," said Steve Poizner, SnapTrack president. "Through TI, SnapTrack's technology will be readily available to a significant percentage of wireless devices."

Under terms of the commercial agreement, which includes the licensing of SnapTrack software by TI, the companies will jointly integrate SnapTrack's enhanced Global Positioning System (EGPS) technology with TI's advanced DSP platforms for digital wireless systems. TI is the world leader in DSP and provides DSP solutions for more than two thirds of the digital wireless handsets around the world. Products resulting from the development will allow wireless handset manufacturers to easily and cost-effectively integrate location capabilities into their products. Financial terms of the transaction were not disclosed, but in a related move TI recently increased its equity investment in SnapTrack.

"TI will offer a DSP solution with embedded SnapTrack GPS technology for digital wireless phones that will enable TI wireless customers to add high-performance location functionality to their products with minimal effort and expense," said Bob Carl, manager of Americas marketing for Texas Instruments. "Personal location technology will not only make it easier to locate wireless phone users, it will give them access to a broad array of location-based services offered by carriers to make their lives easier and more productive."

Location-enabled phones are the first step in wireless service providers meeting the federal mandate that requires them to locate wireless 9-1-1 calls by Oct. 1, 2001. With SnapTrack's personal location technology embedded in handsets based on TI's DSP solutions, and SnapTrack's server software running in their networks, it is expected carriers will be able to deploy this critical location service sooner than competing options. While the mandate requires that wireless 9-1-1 calls be located to within 125 meters, SnapTrack's system typically locates calls to within 25 meters, and within 5 meters under optimal conditions.

SnapTrack's personal location technology will allow wireless service providers to offer such value-added services as location-based billing, driving directions, mobile yellow pages and concierge services. These services not only will provide new sources of revenue, but also can help decrease churn and increase customer loyalty.

#### **About SnapTrack Technology**

SnapTrack's personal location technology improves upon conventional GPS performance by sharing

processing tasks between patented software algorithms which harness the power of the digital signal processor (DSP) inside a wireless handset and sophisticated server software running in the wireless network; by using information available from the wireless network itself; and by processing only a snapshot of GPS data, rather than processing continuously.

While traditional GPS receivers may take several minutes to provide a location "fix," SnapTrack's system typically locates callers within 2-3 seconds, even under harsh conditions where conventional GPS does not operate, such as inside buildings and cars, under dense foliage and in street canyons between high-rise buildings. The system requires no expensive infrastructure modifications to the wireless network. SnapTrack's personal location technology is air-interface independent and is applicable in any two-way cell-based wireless system: cellular or paging; 800/900 MHz or 1800/1900 MHz; CDMA, TDMA, GSM or iDEN..

### **About SnapTrack**

Headquartered in San Jose, Calif., SnapTrack is focused on integrating GPS and two-way wireless technologies. For more information on the activities of or possible participation in SnapTrack testing.

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# **MOTOROLA**

**FOR IMMEDIATE RELEASE:**

April 26, 1999

## **Motorola Partners with SnapTrack to Bring Personalized Location Services to Mobile Consumers Worldwide**

*Chip-Level Integration Cost-Effectively Adds  
GPS Feature To Mobile Devices*

AUSTIN, TX. -- April 26, 1999 -- Motorola's Semiconductor Products Sector (SPS) announced today that it has entered into a strategic relationship with SnapTrack to offer personal location services as an integral part of its wireless chip-sets for mobile consumers. Motorola will license SnapTrack's personal location technology to complement its DigitalDNA™ solutions for wireless platforms.

Under the terms of the agreement, SnapTrack will provide Motorola Semiconductor with its wireless-assisted Global Positioning System (GPS) technologies for mobile devices. In addition to the broad licensing agreement, Motorola has made an equity investment in SnapTrack. Financial terms of the transaction were not disclosed.

Once these services are deployed, mobile users will be able to take advantage of enhanced wireless 911, 411 and roadside assistance services. In the future, consumers will have the ability to receive new wireless services, such as location-specific traffic information -- including maps and detailed directions -- directly to their personal mobile devices. Other possible benefits to wireless customers include personalized access to wireless yellow page information on local restaurants, concierge services, weather updates, or location-specific electronic coupons while shopping.

The Federal Communications Commission (FCC) has mandated that wireless carriers have the ability to locate wireless callers to 9-1-1 to within 125 meters by October 1, 2001; in multiple trials, SnapTrack technology has exceeded this requirement.

(more)

"We are impressed with SnapTrack's concept and recent CDMA tests in Tampa, Florida have provided real data that demonstrates the capability of the technology," said Mario Rivas, corporate vice president and general manager, Motorola Wireless Subscriber Systems Group. "By integrating high-performance GPS functionality in the chip-sets we sell for mobile communications, Motorola has the ability to offer value added services to our customers. All this becomes possible through a creative combination of Motorola and SnapTrack technologies."

Besides meeting the FCC mandate for locating wireless customers, carriers can benefit from new revenue streams based on location-sensitive billing and location-sensitive information delivery. Location services also offer opportunities for carriers to optimize their networks for maximum performance.

"In the near future, wireless systems built around Motorola semiconductors will enable information delivery that is specific to your location, instantaneously. This opens up a whole world of safety and productivity-enhancing services for mobile users, and provides a new means for consumers to connect with the network operators and service providers that they rely on everyday," said Steve Poizner, president of SnapTrack.

SnapTrack's wireless-assisted GPS improves upon conventional GPS performance in part by sharing processing tasks between patented software algorithms inside a wireless device and sophisticated server software running in the wireless network. Motorola's Semiconductor Products Sector can now embed SnapTrack in their digital signal processor-based (DSP) baseband processors for wireless devices. The result will be extremely rapid, highly accurate location determination in a wide variety of environments, including difficult signal environments such as inside cars, houses, and office buildings.

(more)

## Motorola/SnapTrack 3

As the world's #1 producer of embedded processors, Motorola's Semiconductor Products Sector offers multiple DigitalDNA(tm) solutions which enable its customers to create new business opportunities in the consumer, networking and computing, transportation, and wireless communications markets. Motorola's worldwide semiconductor sales were \$7.3 billion (USD) in 1998.

<http://www.motorola.com/sps>

Motorola is a global leader in providing integrated communications solutions and embedded electronic solutions. Sales in 1998 were \$29.4 (USD) billion.

<http://www.motorola.com>

Headquartered in San Jose, Calif., SnapTrack is focused on integrating GPS and two-way wireless technologies.

<http://www.snaptrack.com>

Motorola is a registered trademark and DigitalDNA is a trademark of Motorola, Inc.  
All other tradenames, trademarks, and registered trademarks are the property of their respective owners.

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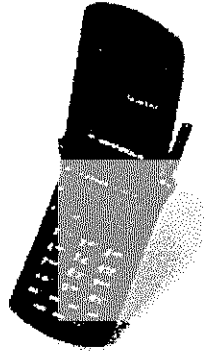
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